



**Top 10 reasons mobile operators
should reject CS Fallback (CSFB)
as the interim solution for voice
over LTE networks**

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→ 1. Call-setup times with CSFB will be longer than they are in 2G or 3G.

CSFB introduces an additional call-setup delay on top of the call-setup times subscribers expect from 2G or 3G networks. This creates a retrograde experience for users on the new LTE network and will be impossible to market to LTE subscribers. The degraded end-user experience is likely to translate into subscriber dissatisfaction and an increased churn rate back to 3G networks.

→ 2. Failure rates for call-setup in CSFB may increase to the same level as call-drop rates for handovers.

In mobile networks, failed network-to-network handovers are by far the most frequent cause of dropped calls. Mobile operators using CSFB risk a high percentage of call-setup failures because CSFB imposes a handover-based fallback action during the critical call setup procedure; that is, each inbound and outbound call forces the handset to handover/fallback from one cell to another cell. The result is significantly more opportunities for calls to fail.

To reduce (but not eliminate) call setup delays, CSFB relies upon a blind handover that skips a key step – adjacent cell measurement by the handset – used to assist the network in finding the best target cell for handover. Bypassing this crucial handset assist can result in even higher drop rates during CSFB than the rates shown in statistics for call drops during handover in mobile networks today.

→ 3. CSFB stifles the IMS data and applications experience.

Active packet-service (PS) sessions and other IMS-based applications will be interrupted or even suspended when a circuit-service (CS) voice call is made or received. This is not the behavior expected in the new LTE network.

For example, with CSFB, voice calls can delay or suspend time sensitive communication when the handset falls back to the 2G network. This affects ‘always-on’ applications like the IMS RCS Presence Manager and Live Address Book.

→ 4. CSFB requires legacy RAN coverage everywhere covered by LTE.

In order to support the CSFB procedure, every LTE cell in the PLMN must be co-resident with a strong, overlapping GERAN or UTRAN signal. Voice calls made using CSFB without a sustainable GERAN/UTRAN signal will fail, even when the handset reports good coverage from the LTE cell.

It could be particularly difficult for legacy RAN deployed in higher frequency bands to cover the same locations as LTE deployed in lower frequency bands (e.g. Digital Dividend bands).

Another casualty of CSFB would be in-building LTE femtocells where outdoor legacy RAN coverage may not reach indoors sufficiently to handle the CSFB calls. With CSFB, mobile operators may need to divert capital to augment the legacy RAN just enough to ensure adequate fallback coverage in LTE covered locations.

→ 5. Operators deploying CSFB must retain spectrum for legacy RAN use.

Legacy RAN spectrum cannot be re-farmed for LTE or any other use until the last CSFB user (home and visiting) has migrated to VoIMS. Operators may be forced to support their legacy 2G or 3G networks simply to maintain support for roaming subscribers with CSFB capabilities. This may have a significant impact on some operators’ spectrum plans and may even require operators to license new spectrum if legacy spectrum cannot be re-farmed in a timely manner.

→ **6. CSFB requires investment in the legacy MSC and additional support for new, CSFB-only features in the E-UTRAN.**

All 2G/3G MSCs must be upgraded to support CSFB procedures over the new SGs interface. In addition, all eNodeBs and MMEs must support new procedures required for CSFB only, with no other use – not even for SMS-over-SGs delivery. CSFB introduces legacy CS functionality into an otherwise clean LTE packet network. Once deployed, all of these new features must be supported and tested for each new software release. They can never be retired from the network as long as either home or visiting CSFB users are active.

→ **7. CSFB requires investment in the legacy RAN to improve performance.**

For anything other than the basic RRC Redirection method for CSFB, which provides the poorest call setup performance, the legacy RAN may need to be upgraded to support PS Handover and/or NACC. CSFB-capable handsets would need to support all of the CSFB methods and feature dependencies to work properly on different networks. CSFB requires collateral investment in the legacy RAN that need to be accounted for in the CSFB business case.

→ **8. CSFB requires investment in the signaling transport network and HLR/HSS.**

The incremental amount of network signaling required to support CSFB is projected to be an order of magnitude (or more) greater than the standard UTRAN or GERAN use cases. Significant investment in the signaling transport network and HLR elements will be required to support CSFB usage.

→ **9. Operators deploying voice over IMS will still have to invest in all CSFB-specific network enhancements to support CSFB roaming users.**

Voice over IMS operators will not be able to escape the cost of CSFB in their network if it becomes the interim voice over LTE technology. The IMS voice operators' LTE network would need to be upgraded to support CSFB just so that the operator can accept inbound roamers from CSFB-based networks. Therefore, in addition to the investment in IMS voice infrastructure, the operator must also invest in CSFB upgrades for their LTE network, the legacy RAN and their MSCs.

This is a considerable undertaking in both operational complexity and capital expenditure. It is also unnecessary if operators chose a better interim voice over LTE solution.

→ **10. CSFB has no synergy with Voice over IMS.**

CSFB and VoIMS solutions are fundamentally different. Each solution requires a different set of features and functionality in order to be purchased, deployed and maintained in the LTE network. They have nothing in common.

Implementing CSFB provides no benefit to operators who either have or will deploy a VoIMS system and vice versa. The investment in commercializing CSFB is wasted time, effort and capital since none of it moves the network forward to an all IP network infrastructure.